



Nuclear Safety Network (NSnet)
Ohtemachi Building #437
1-6-1 Ohte-machi, Chiyoda-ku, Tokyo 100-0004
Tel: 03-5220-2666 Fax: 03-5220-2665
URL: <http://www.nsnet.gr.jp>

NSnet document number : (NSP-RP-001)

Date of publication: May 12, 2000

Summary Report of Peer Review

(Provisional Translation)

Place of Evaluation:	Mitsubishi Nuclear Fuel Co., Ltd. (Tokai-mura, Naka-gun, Ibaraki prefecture)
-------------------------	---

Date of Evaluation:	April 18-21, 2000
------------------------	-------------------

Publisher:	Nuclear Safety Network
------------	------------------------

Table of Contents

1. Objectives	.....	1
2. Areas of Review	.....	1
3. Execution of Review	.....	2
4. Summary of the Facility Operation	.....	3
5. Main Conclusions	.....	4

1. Objectives

The purpose of the NSnet peer review is to achieve an improvement in the “safety culture” of the entire nuclear power industry by sending review teams of member specialists to member facilities, where they conduct reciprocal evaluations on common nuclear safety subjects among members and share mutual knowledge about the horizontal progress of good practices as well as subjects that have been singled out.

2. Areas of Review

In this peer review, a lesson was learned from the occurrence of the nuclear criticality accident (hereafter referred to as “the JCO accident”) that occurred last year at the JCO uranium processing plant. The areas of review at nuclear fuel facilities, therefore, center upon the appropriate performance of work on nuclear safety, including the prevention of serious accidents such as criticality and fires/explosions.

The review was divided into six areas: organization/administration, emergency measures, education/training, operation/maintenance, radiation protection, and serious accident prevention. An evaluation was made by comparing performance to the best practice in the nuclear energy industry.

In the area of serious accident prevention, nuclear criticality accidents were added to accidents involving fires, explosions, and uranium hexafluoride leakage when the safety of the nuclear fuel facilities was evaluated. The prevention of occurrence was the target of this review.

In the other areas, the review targeted a number of issues that relate to the factors behind the occurrence of the JCO accident. These are organizational policies and activities aimed at stimulating the development of a “safety culture,” the system of organization and the clarification of responsibility, worker education/training, worker knowledge/skill, observation of written operation procedures, and the transfer of technical knowledge.

Moreover, the company’s self-checking activities that affect operation safety were especially targeted in the review of the process, facilities, and equipment. Emphasis was placed on the safety awareness and ethics of the employees.

At the time of the review, it was also thought that one factor behind the JCO accident was the implementation of efficiency improvement measures by the management that drastically reduced the number of personnel. These measures were implemented because of poor business performance, which was caused by the international price competition started in 1990s.

3. Execution of Review

From April 18th to the 21st of this year, a review was conducted at Mitsubishi Nuclear Fuel Co., Ltd. in Tokai-mura, Ibaraki Prefecture. The review team consisted of seven people in all. There was one clerical manager from NSnet and six reviewers, one each from The Tokyo Electric Power Co., Inc., The Japan Nuclear Cycle Development Institute (JNC), Nuclear Fuel Transport Co., Ltd., Fuji Electric Co., Ltd., Hokkaido Electric Power Co., and the NSnet office. To conduct the review, the six reviewers were assigned to one of three groups, two reviewers per group.

The first group was responsible for reviewing organization/administration, emergency measures, and education/training. The second group handled operation/maintenance, and radiation protection. The third group reviewed the prevention of serious accidents.

The review recognized a number of good practices and some suggestions for improvement by mainly observing the plant, targeting various activities promoted by the workers themselves for the improvement of safety, and by interviewing workers, confirming documents presented, and asking questions based on the documents.

In the course of the review, the review team aimed at exchanging ideas about the nuclear power “safety culture.” One way the team attempted to accomplish this was through the communication of useful practices carried out by the members, such as an appropriate introduction of the regular inspection pocketbook, which included the power plant’s declarations for safe operations, and a self-inspection question book made as a reference for the International Atomic Energy Agency’s (IAEA) “safety culture” check index (INSAG-4 ASCOT Guidelines).

4. Summary of the Facility Operation

The company targeted in this review, Mitsubishi Nuclear Fuel Co., Ltd. began operations in December 1971. Its main business has been the manufacturing of pressurized water reactor nuclear fuel (PWR fuel). The number of employees including those at the company's subsidiaries totals about 500 people. The facilities extend over the Tokai-mura and Naka-machi area, with the main processing facility located at Tokai-mura. Both the processing building used for the production of uranium fuel containing gadolinium and the fuel processing test building is located in Naka-machi.

At the processing facilities (the main processing facility and the processing building for the production of uranium fuel containing gadolinium), the approved uranium enrichment is below 5%. The uranium enrichment presently handled is most often 4.1%.

The main processing facility basically consists of parallel production lines. For the conversion step (the process by which uranium hexafluoride material is converted into uranium dioxide powder) and the pelleting process (the process where the uranium dioxide is hardened into the shape of a pill called a pellet), a system of operation consisting of three shifts per 24 hours is used, whereas, the subsequent processes (the fuel rod assembly process and the fuel assembly process) are on a day shift operation. All processes are shut down on Saturdays and Sundays. The processing building for the production of uranium fuel containing gadolinium is constructed to handle the manufacturing of uranium fuel pellets that contain gadolinium and the manufacturing of fuel rods that encase the fuel pellets in cladding tubing. Of these processes, the system of operation for the manufacturing of pellets consists of three shifts every 24 hours.

The building for the fuel research and development is a facility having approved uranium enrichment below 20%. In this facility, research and development of nuclear fuel is mainly carried out by using enriched uranium below 5%. Enriched uranium of about 20% was previously used in this facility when irradiation-testing fuel was manufactured. The enriched uranium is presently kept in a storage facility.

The manufacturing of PWR fuel at this company yielded 200-300 tons of uranium per year over the past ten years. This meets about two-thirds of Japan's demand for PWR fuel.

5. Main Conclusions

Taking a broad view of the results of the review conducted at Mitsubishi Nuclear Fuel Co., Ltd., with respect to nuclear safety, no problems were found that would lead to the occurrence of a serious accident, even if the improvement measures were not adopted immediately. Moreover, it is confirmed that managers and employees are united as one and are conscientiously working toward continuing and strengthening the guarantee of nuclear industry safety. In the future, it is desirable that the company continues making further efforts for fostering a better “safety culture” and that the company will never forget the lessons learned at the JCO accident.

At the peer review this time, a number of good practices were discovered that should be introduced to the other NSnet members and the nuclear energy industry. The main examples are listed below.

- The TPM (Total Productive Maintenance) activity, which is a wide-ranging management operation learned from outside organizations, was developed with the participation of all employees. It contributes not only to managerial efficiency but also to strengthen the company’s safety.
- Know-how that ensures on-site safety is compiled in a booklet called “Safety Guidance.” The booklet is effectively used to teach technology and on-site operations. As an activity related to quality assurance, the “know why” activity, which promotes the understanding of the established basis for parameters of product quality management, is being developed to cultivate human resources and transfer technology among groups.
- The necessary equipments and facilities are specifically set aside for criticality safety control. The methods and contents of criticality safety management are being fully examined from the viewpoint of preventing criticality. These results are reflected in the “Operation Procedures” for plant daily operations.

In order to continue the good performance to date and further improve the present safety level of the Mitsubishi Nuclear Fuel Co., Ltd., some proposals are given, the main

ones of which are listed below.

- Concerning the duties of chief nuclear fuel handling manager, including the integration of various rules, it is suggested that the company systematically summarize existing various rules related to safety.
- “Employee’s Policy Chapter 10” clarifies the company’s ideas and vision shared by the employees.” It is recommended to clarify that the top priority is guaranteeing nuclear safety.
- It is suggested to highlight the vital points of nuclear safety in the ‘Operation procedures.’”
- To strongly emphasize the lessons of the JCO accident, they should be given to the workers using more effective education materials. In the future, we expect this “safety culture” to reach all concerned employees, including the workers involved in production, especially in the area of criticality safety.

Other details concerning this report may be found on the Japanese homepage.